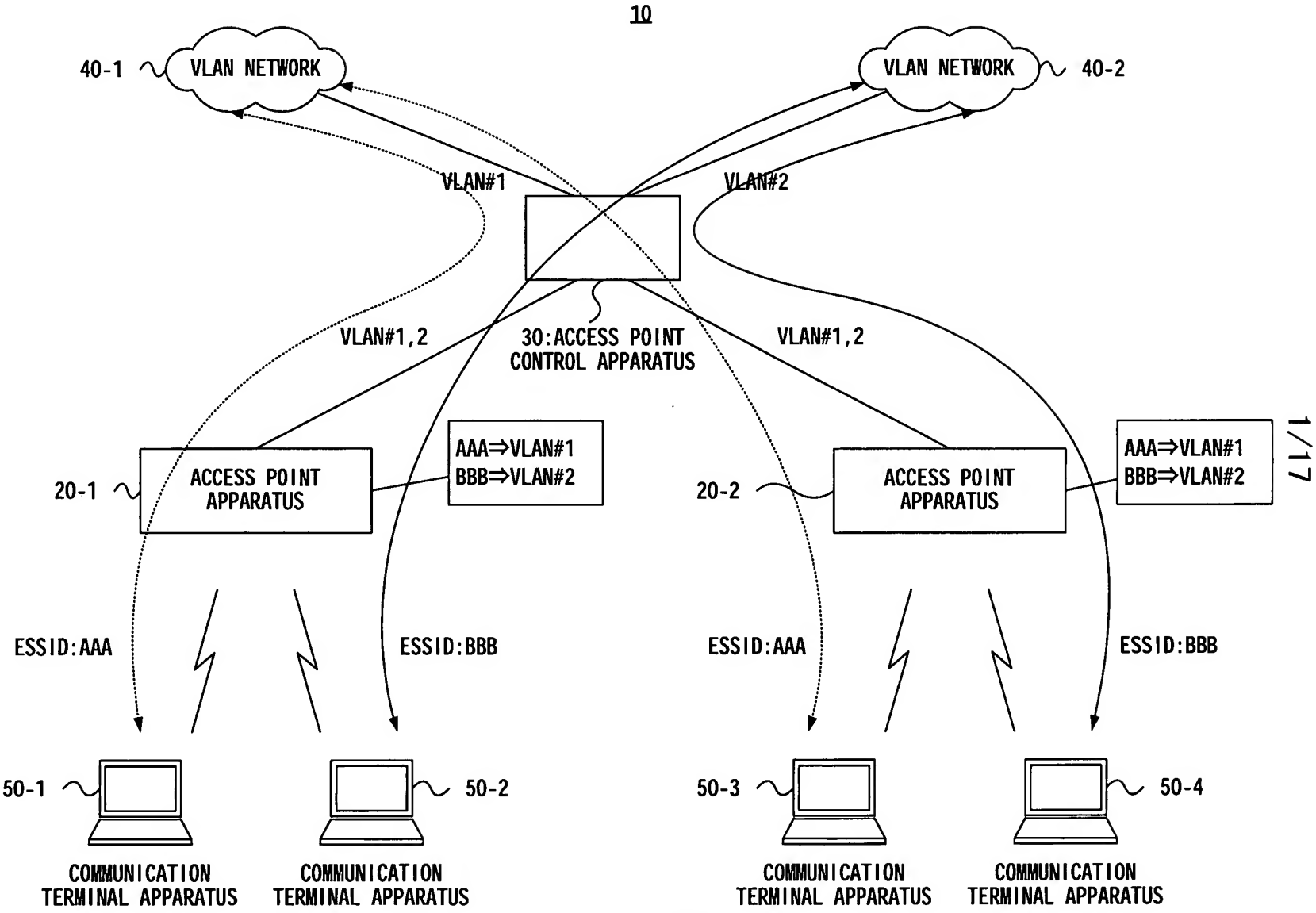
10
40-1
VLAN NETWORK
VLAN NETWORK
40-2
VLAN#1
VLAN#2
VLAN#1,2
30:ACCESS POINT CONTROL APPARATUS
VLAN#1,2
AAA⇒VLAN#1
BBB⇒VLAN#2
20-1
ACCESS POINT APPARATUS
20-2
ACCESS POINT APPARATUS
AAA⇒VLAN#1
BBB⇒VLAN#2
ESSID:AAA
ESSID:BBB
ESSID:AAA
ESSID:BBB
50-1
50-2
50-3
50-4
COMMUNICATION TERMINAL APPARATUS
COMMUNICATION TERMINAL APPARATUS
COMMUNICATION TERMINAL APPARATUS
COMMUNICATION TERMINAL APPARATUS

FIG.1

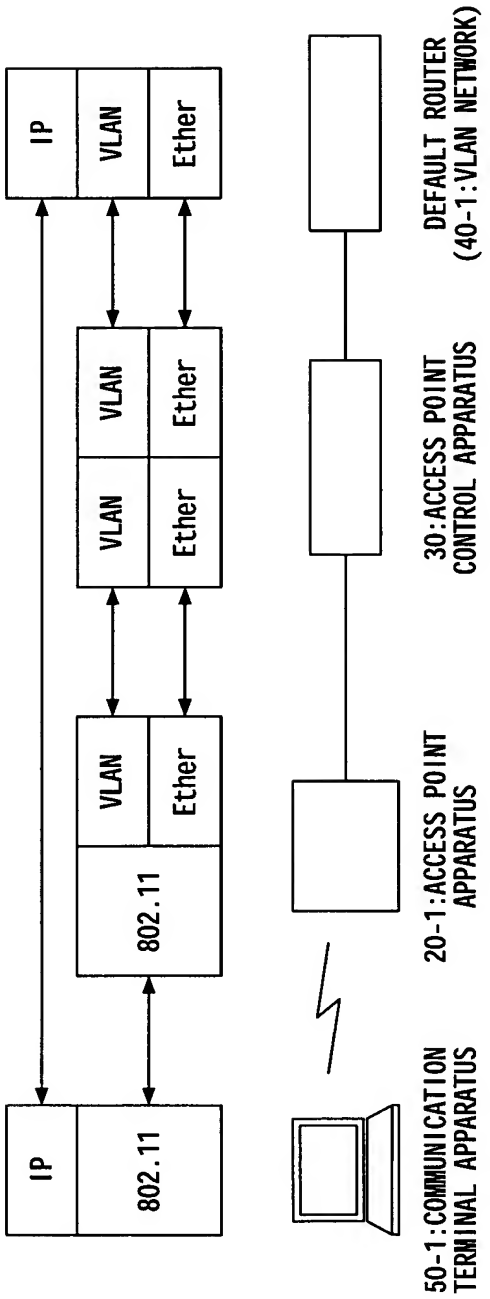
IP
802.11
VLAN
Ether
VLAN
Ether
VLAN
Ether
VLAN
Ether
50-1:COMMUNICATION TERMINAL APPARATUS
20-1:ACCESS POINT APPARATUS
30:ACCESS POINT CONTROL APPARATUS
DEFAULT ROUTER (40-1:VLAN NETWORK)

FIG.2

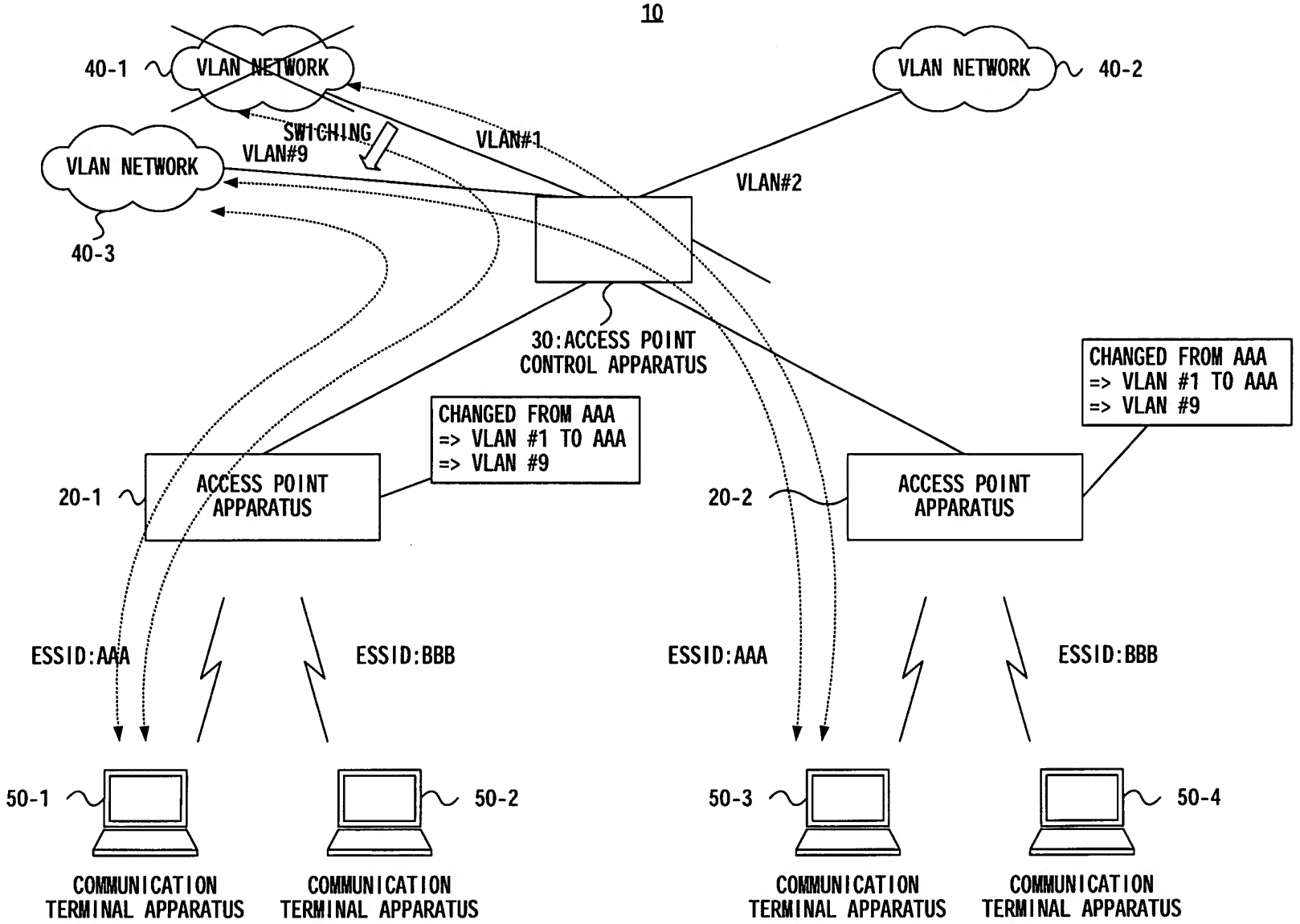
10
40-1
VLAN NETWORK
VLAN NETWORK
40-2
SWITCHING
VLAN#9
VLAN#1
VLAN NETWORK
VLAN#2
40-3
30:ACCESS POINT
CONTROL APPARATUS
CHANGED FROM AAA
=> VLAN #1 TO AAA
=> VLAN #9
CHANGED FROM AAA
=> VLAN #1 TO AAA
=> VLAN #9
20-1
ACCESS POINT
APPARATUS
20-2
ACCESS POINT
APPARATUS
ESSID:AAA
ESSID:BBB
ESSID:AAA
ESSID:BBB
50-1
50-2
50-3
50-4
COMMUNICATION
TERMINAL APPARATUS
COMMUNICATION
TERMINAL APPARATUS
COMMUNICATION
TERMINAL APPARATUS
COMMUNICATION
TERMINAL APPARATUS

FIG.3

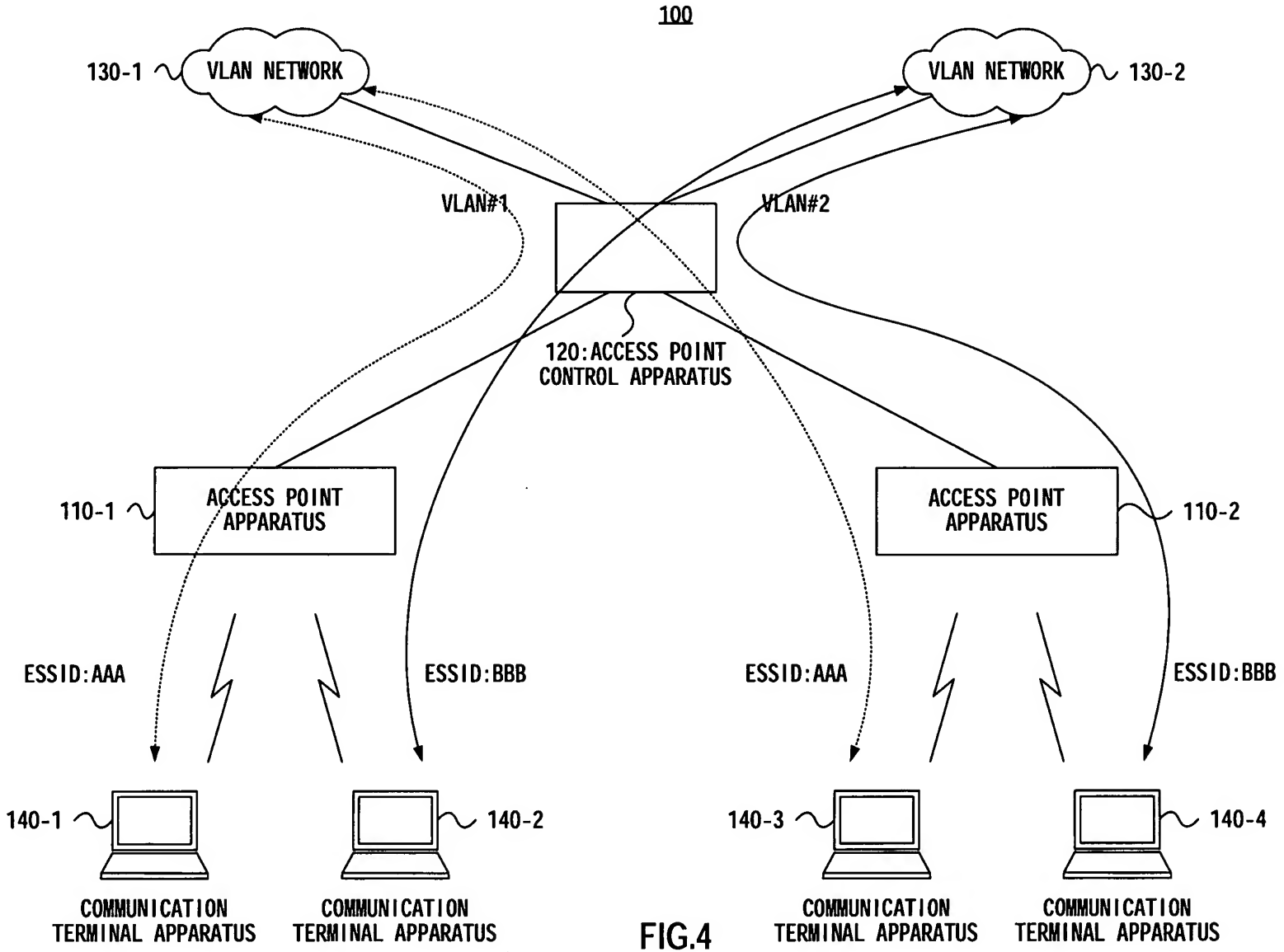
100
130-1
VLAN NETWORK
VLAN NETWORK
130-2
VLAN#1
VLAN#2
120:ACCESS POINT
CONTROL APPARATUS
110-1
ACCESS POINT
APPARATUS
ACCESS POINT
APPARATUS
110-2
ESSID:AAA
ESSID:BBB
ESSID:AAA
ESSID:BBB
140-1
140-2
140-3
140-4
COMMUNICATION
TERMINAL APPARATUS
COMMUNICATION
TERMINAL APPARATUS
COMMUNICATION
TERMINAL APPARATUS
COMMUNICATION
TERMINAL APPARATUS

FIG.4

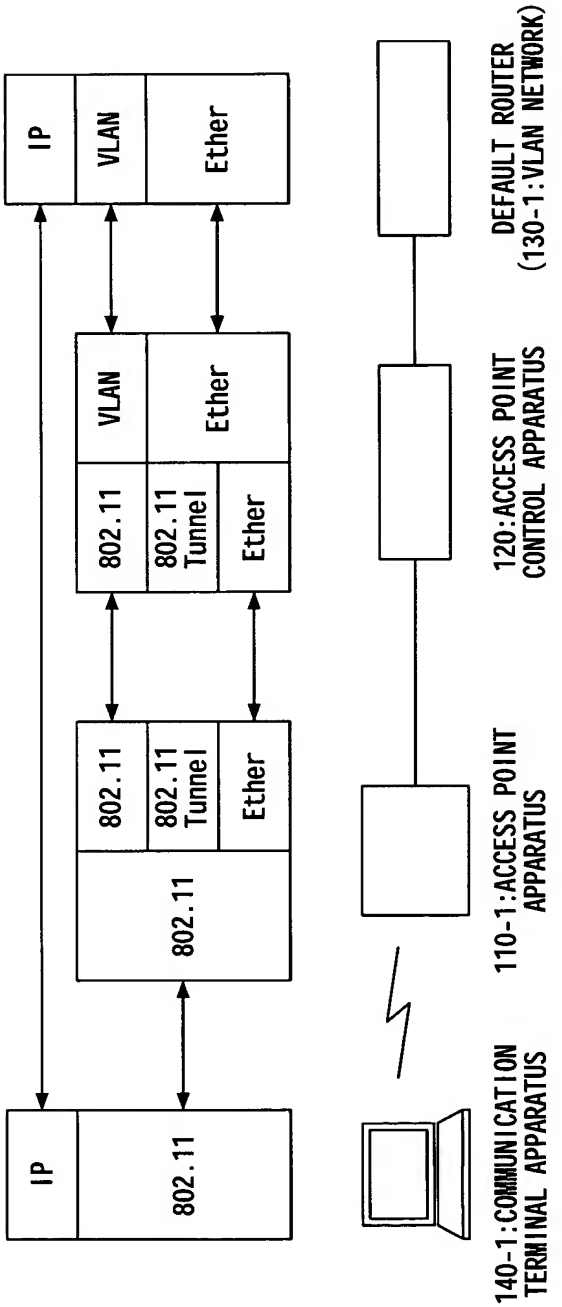
IP
802.11
802.11
802.11 Tunnel
Ether
802.11
VLAN
802.11 Tunnel
Ether
VLAN
Ether
IP
140-1:COMMUNICATION TERMINAL APPARATUS
110-1:ACCESS POINT APPARATUS
120:ACCESS POINT CONTROL APPARATUS
DEFAULT ROUTER (130-1:VLAN NETWORK)

FIG.5

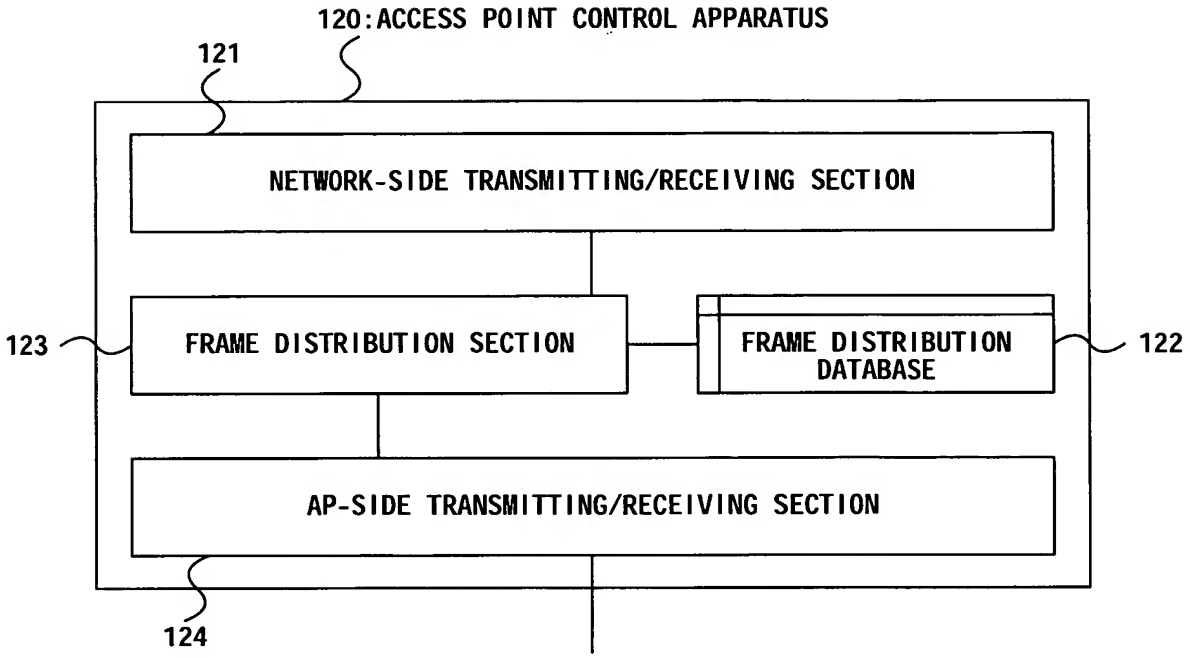
120:ACCESS POINT CONTROL APPARATUS
121
NETWORK-SIDE TRANSMITTING/RECEIVING SECTION
123
FRAME DISTRIBUTION SECTION
FRAME DISTRIBUTION DATABASE
122
AP-SIDE TRANSMITTING/RECEIVING SECTION
124

FIG.6

1221

| VLAN / ESSID | VLAN |
|---|---|
| AAA | #1 |
| BBB | #2 |
| CCC | #3 |
| DDD | #1 |
| EEE | #3 |
| ... | |

FIG.7

1222

| ESSID / AP | AAA | BBB | CCC | ... |
|---|---|---|---|---|
| AP1 | ○ | ○ | | |
| AP2 | ○ | ○ | | |
| AP3 | ○ | | ○ | |
| AP4 | | | ○ | |
| ... | | | | |

FIG.8

1223

| | BSSID | VLAN |
|---|---|---|
| AP1 | AP1-1 | #1 |
| | AP1-2 | #2 |
| AP2 | AP2-1 | #1 |
| | AP2-2 | #2 |

FIG.9

1224

| ESSID / TERMINAL | BSSID |
|---|---|
| MT1 | AP1-1 |
| MT2 | AP2-1 |
| MT3 | AP1-2 |
| MT4 | AP2-2 |
| ... | |

FIG.10

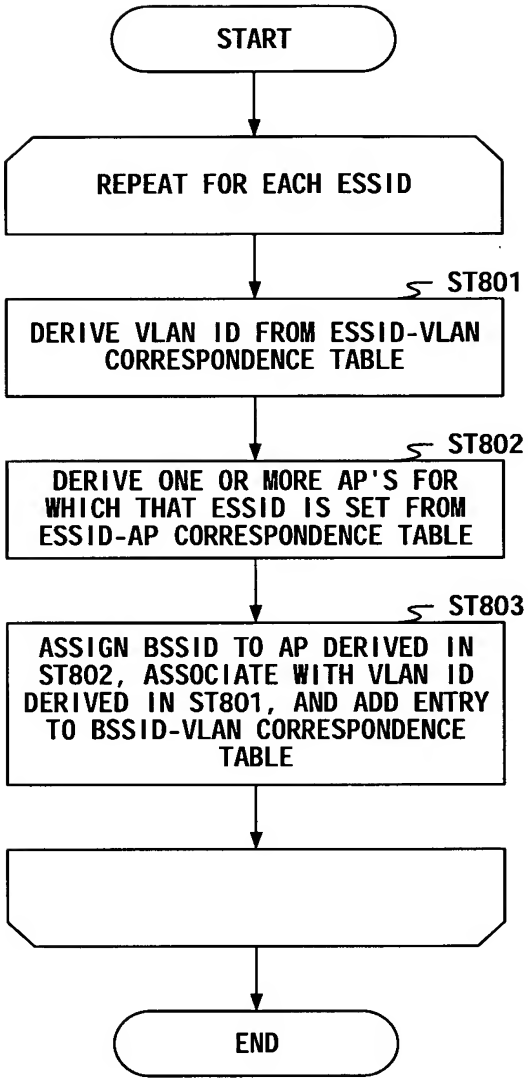
START
REPEAT FOR EACH ESSID
ST801
DERIVE VLAN ID FROM ESSID-VLAN CORRESPONDENCE TABLE
ST802
DERIVE ONE OR MORE AP'S FOR WHICH THAT ESSID IS SET FROM ESSID-AP CORRESPONDENCE TABLE
ST803
ASSIGN BSSID TO AP DERIVED IN ST802, ASSOCIATE WITH VLAN ID DERIVED IN ST801, AND ADD ENTRY TO BSSID-VLAN CORRESPONDENCE TABLE
END

FIG.11

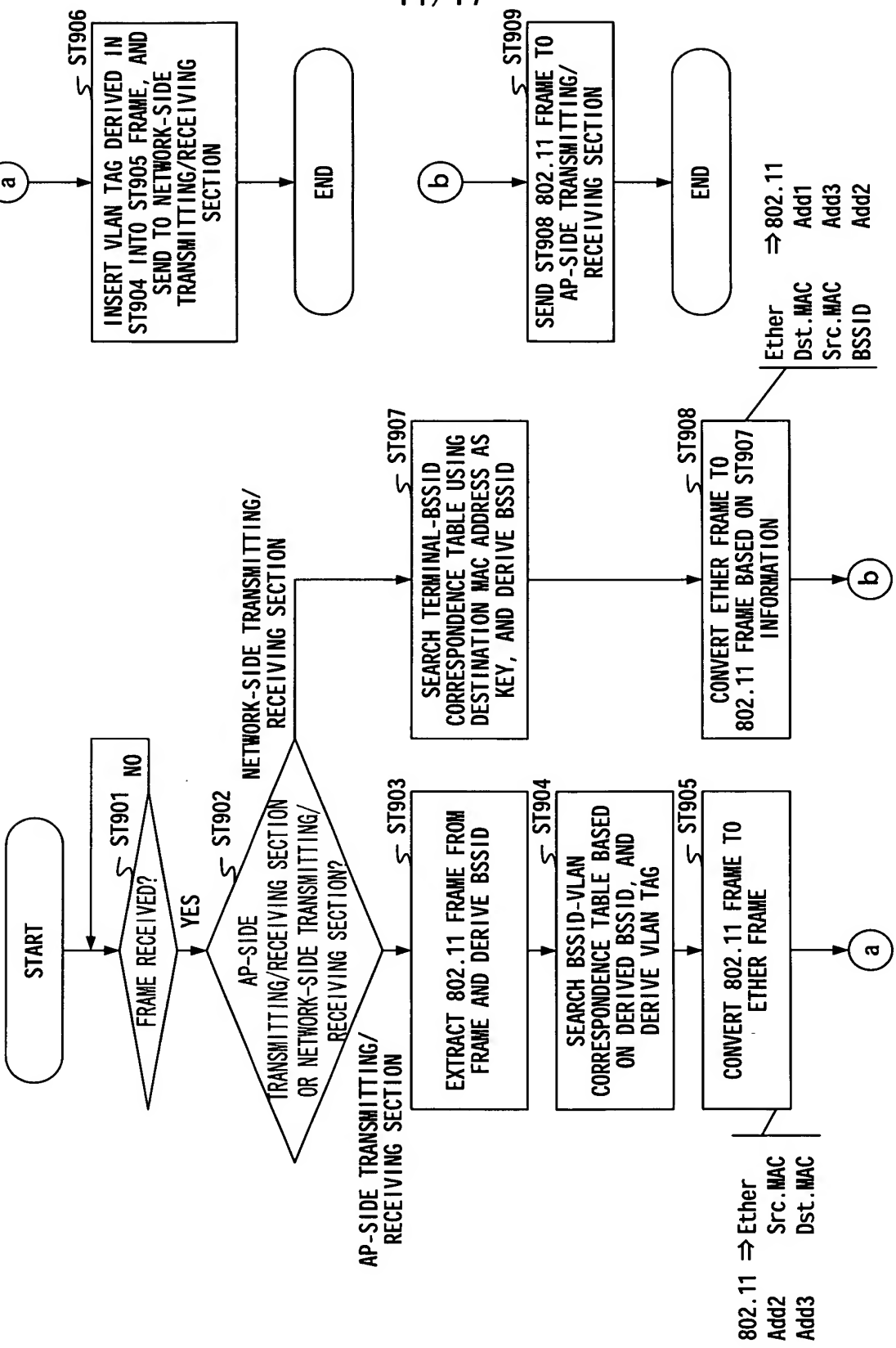
START
ST901
FRAME RECEIVED?
NO
YES
ST902
AP-SIDE TRANSMITTING/RECEIVING SECTION OR NETWORK-SIDE TRANSMITTING/RECEIVING SECTION?
NETWORK-SIDE TRANSMITTING/RECEIVING SECTION
AP-SIDE TRANSMITTING/RECEIVING SECTION
ST903
EXTRACT 802.11 FRAME FROM FRAME AND DERIVE BSSID
ST904
SEARCH BSSID-VLAN CORRESPONDENCE TABLE BASED ON DERIVED BSSID, AND DERIVE VLAN TAG
ST905
CONVERT 802.11 FRAME TO ETHER FRAME
802.11 ⇒ Ether
Add2 Src.MAC
Add3 Dst.MAC
a
ST907
SEARCH TERMINAL-BSSID CORRESPONDENCE TABLE USING DESTINATION MAC ADDRESS AS KEY, AND DERIVE BSSID
ST908
CONVERT ETHER FRAME TO 802.11 FRAME BASED ON ST907 INFORMATION
Ether ⇒ 802.11
Dst.MAC Add1
Src.MAC Add3
BSSID Add2
b
ST906
INSERT VLAN TAG DERIVED IN ST904 INTO ST905 FRAME, AND SEND TO NETWORK-SIDE TRANSMITTING/RECEIVING SECTION
END
a
ST909
SEND ST908 802.11 FRAME TO AP-SIDE TRANSMITTING/RECEIVING SECTION
END
b

FIG.12

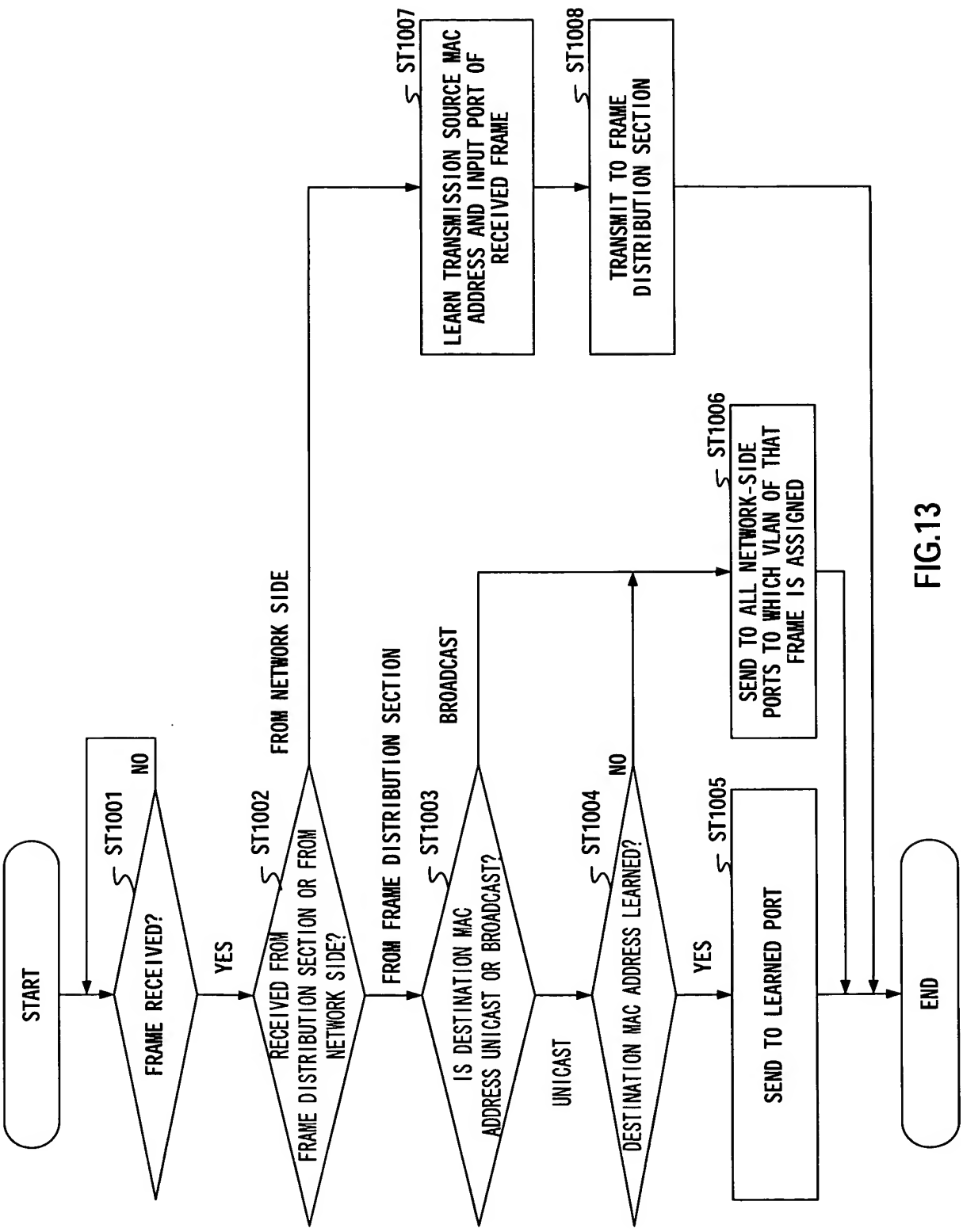
START
ST1001
FRAME RECEIVED?
NO
YES
ST1002
RECEIVED FROM FRAME DISTRIBUTION SECTION OR FROM NETWORK SIDE?
FROM NETWORK SIDE
FROM FRAME DISTRIBUTION SECTION
ST1003
IS DESTINATION MAC ADDRESS UNICAST OR BROADCAST?
BROADCAST
UNICAST
ST1004
DESTINATION MAC ADDRESS LEARNED?
NO
YES
ST1005
SEND TO LEARNED PORT
ST1006
SEND TO ALL NETWORK-SIDE PORTS TO WHICH VLAN OF THAT FRAME IS ASSIGNED
ST1007
LEARN TRANSMISSION SOURCE MAC ADDRESS AND INPUT PORT OF RECEIVED FRAME
ST1008
TRANSMIT TO FRAME DISTRIBUTION SECTION
END

FIG.13

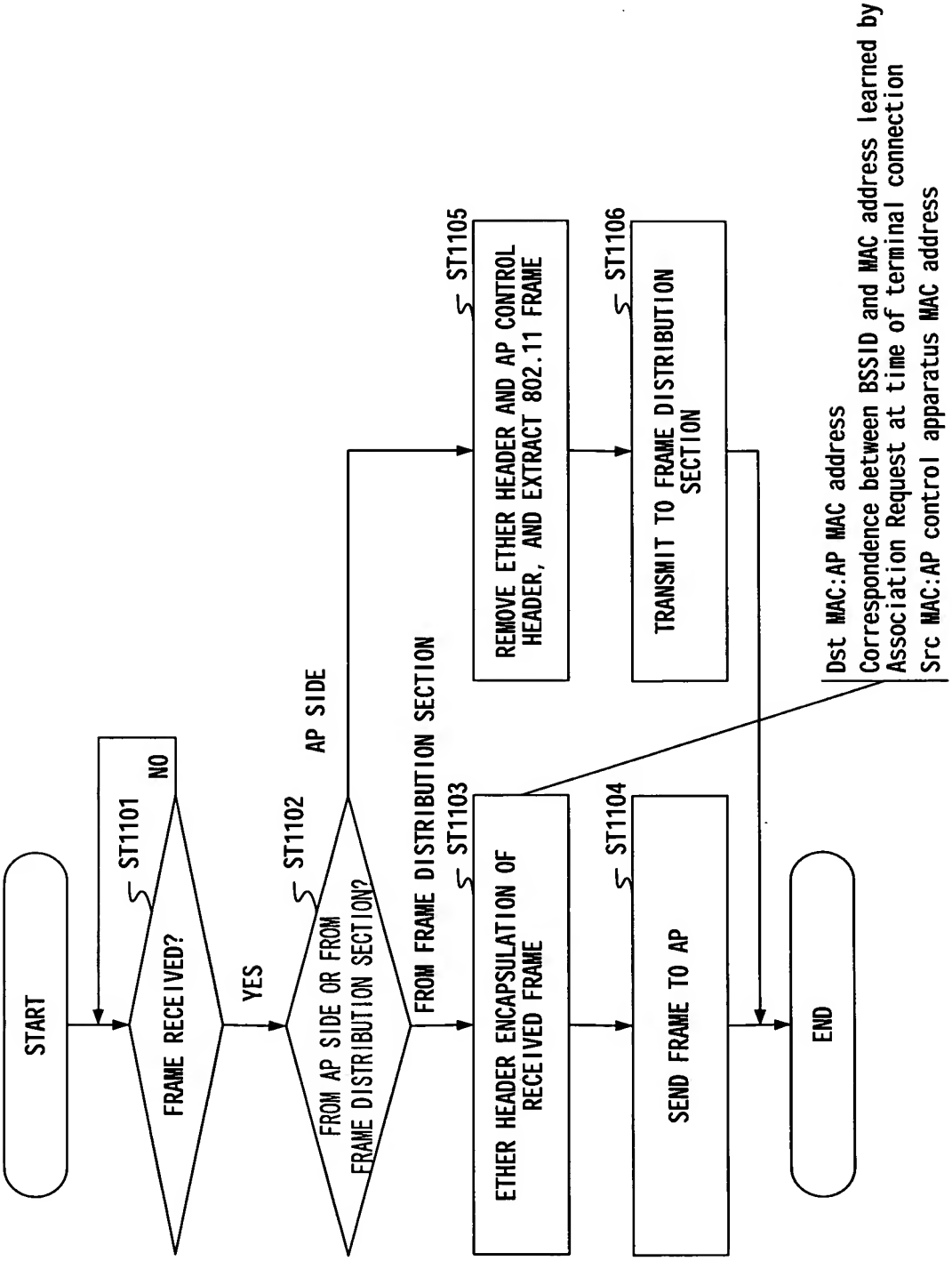
START
ST1101
FRAME RECEIVED?
NO
YES
ST1102
FROM AP SIDE OR FROM FRAME DISTRIBUTION SECTION?
AP SIDE
FROM FRAME DISTRIBUTION SECTION
ST1103
ETHER HEADER ENCAPSULATION OF RECEIVED FRAME
ST1104
SEND FRAME TO AP
ST1105
REMOVE ETHER HEADER AND AP CONTROL HEADER, AND EXTRACT 802.11 FRAME
ST1106
TRANSMIT TO FRAME DISTRIBUTION SECTION
END
Dst MAC:AP MAC address
Correspondence between BSSID and MAC address learned by Association Request at time of terminal connection
Src MAC:AP control apparatus MAC address

FIG.14

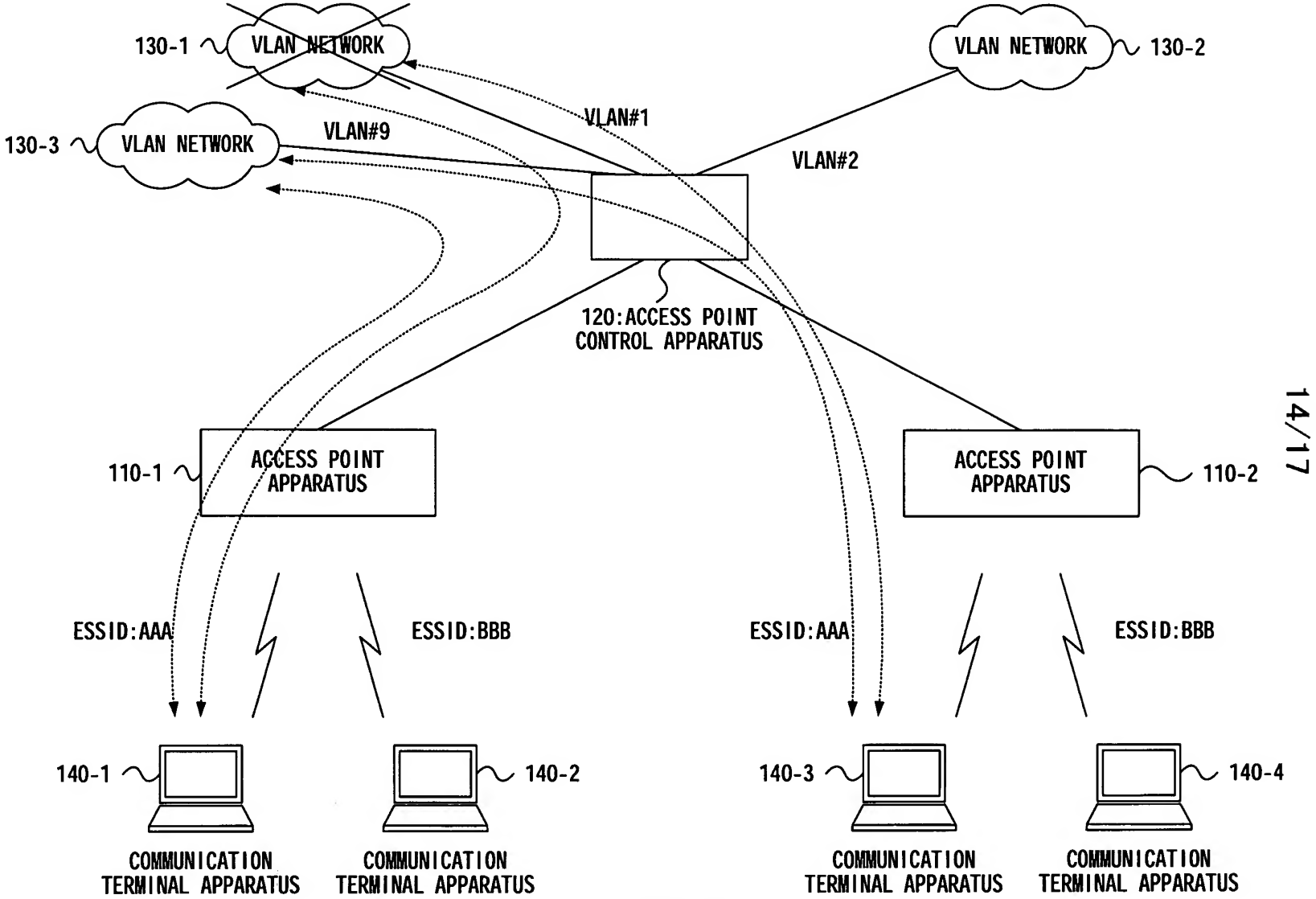
130-1
VLAN NETWORK
VLAN NETWORK
130-2
130-3
VLAN NETWORK
VLAN#9
VLAN#1
VLAN#2
120:ACCESS POINT
CONTROL APPARATUS
110-1
ACCESS POINT
APPARATUS
ACCESS POINT
APPARATUS
110-2
ESSID:AAA
ESSID:BBB
ESSID:AAA
ESSID:BBB
140-1
140-2
140-3
140-4
COMMUNICATION
TERMINAL APPARATUS
COMMUNICATION
TERMINAL APPARATUS
COMMUNICATION
TERMINAL APPARATUS
COMMUNICATION
TERMINAL APPARATUS

FIG.15

1221

| VLAN / ESSID | VLAN |
|---|---|
| AAA | #9 |
| BBB | #2 |
| CCC | #3 |
| DDD | #1 |
| EEE | #3 |
| ... | |

FIG. 16

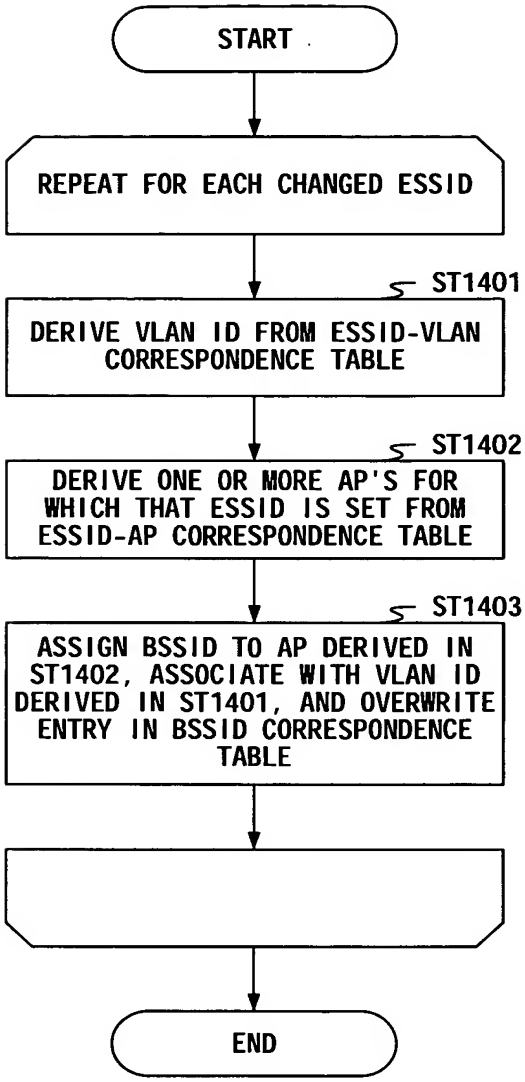
START
REPEAT FOR EACH CHANGED ESSID
ST1401
DERIVE VLAN ID FROM ESSID-VLAN CORRESPONDENCE TABLE
ST1402
DERIVE ONE OR MORE AP'S FOR WHICH THAT ESSID IS SET FROM ESSID-AP CORRESPONDENCE TABLE
ST1403
ASSIGN BSSID TO AP DERIVED IN ST1402, ASSOCIATE WITH VLAN ID DERIVED IN ST1401, AND OVERWRITE ENTRY IN BSSID CORRESPONDENCE TABLE
END

FIG.17

1223

| | BSSID | VLAN |
|---|---|---|
| AP1 | AP1-1 | #9 |
| | AP1-2 | #2 |
| AP2 | AP2-1 | #9 |
| | AP2-2 | #2 |

FIG.18